Family Medicine Trainers' Experience with Cell Phone Use in Primary Care in Nigeria

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Citation

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Abstract

Background

Mobile phones are common communication tools which have found relevance in healthcare delivery and training in developed countries. Their relevance in healthcare systems of developing countries like Nigeria remains speculative. Postgraduate medical doctors' trainers' experience in the use of this technology in healthcare service delivery may provide information on how these devices can be used to improve both training and health service delivery in Nigeria.

Objectives

The objectives of this study were to describe Family Medicine Trainers' Experience, ownership, and related cost in the use of mobile cell phones in outpatient care. The study also sought to identify challenges with cell phone use in patient care.

Methods

A survey of 125 Family Medicine Trainers in Nigeria was carried out to ascertain experience, ownership, and related costs with the use of mobile phones in patients receiving outpatient care. Of the 125 self-administered questionnaires distributed with 109 returned, only 107 found suitable were analysed to ascertain proportions of these variables.

Results

All the 107 (100%) Family Medicine Trainers had a mobile cell phone with 99 % of them having smartphones. About 91% of trainers had high self-reported knowledge of cell phone functions and 98% had provided cell phone related care to patients. Key services rendered were scheduling of appointments by 88% of trainers, prescription of medications 85%, counselling on lifestyle changes 72%; advice on general disease symptoms by 71% and handling of laboratory results by 64% of trainers. However, the majority (67%) of trainers provided these services to less than 10% of their patients monthly. The trainers spent on average N8,000 (USD$ 40) on mobile cell phone use monthly and there is no payment mechanism for the provision of these services to patients.

Conclusion

Ninety-eight percent (98%) of trainers had cell phone related patient care experience but patients' coverage with such service is low. Addressing cost and mechanism of payment for such services have the potential to improve coverage and efficiency of this aspect of service delivery.

INTRODUCTION

Mobile cell phone use in healthcare is on the increase globally and clinicians, especially physicians, have begun to deploy the technology in patient care with good patients' outcomes1,2,3.

Recently, a study in Nigeria on the ownership and use of cell phones among Family Medicine Residents revealed that 96.8% of resident doctors owned smartphones and were using them to provide some aspect of outpatient medical care4. Mobile Phone technology is poised to enable a new era in healthcare delivery globally and in Nigeria where the

National Household and Demographic Survey (NHDS) revealed that 75% of households own a cellphone5,6.

Almost all mobile phones provide Short Message Service (SMS) commonly known as text messaging, and Multimedia Message Service (MMS) for transmitting graphics, video clips and sound graphics. SMS has developed into an essential communication medium especially among younger adults in developing countries 7. Available records showed that the total number of text messages sent globally rose from 1.8 trillion in 2007 to 6.1 trillion in 2010, a threefold rise in utilization of this medium and an average of 200,000 messages every second7. These short messages usually up to 160 characters are sent through mobile phones or from internet to mobile phones of the receivers.

Text messages have instant transmission and low cost when compared to other communication channels. There is also a relatively low chance of being misplaced and they are less invasive to daily lives when compared to phone calls8. Mobile phones robust features of mobility, ubiquity, direct and instantaneous access coupled with communication have promoted their use in health information transfer resulting in increased access to healthcare; improved diagnosis and treatment; enhanced efficiency of service delivery and promotion of self-care9,10. Their use in service delivery range from appointment reminders11, improving patient compliance with medications12,13, monitoring of chronic conditions14 and in health promotion15,16

The use of mobile phones for mHealth service in Nigeria has been on limited scale with few pilot programmes in Ondo, Anambra and Kano states. These programs were aimed at improving maternal and child health services through providing care to expectant mothers and tracking of medical information16. The mobile phone services were also used in the control of Ebola Virus disease in Nigeria17 and a few pilot studies on outpatient medication adherence have also been reported18. There is the need to ascertain experience of clinicians especially trainers in the use of cell phone technology in the delivery of healthcare in the country with emphasis on primary medical care.

Given the current poor health indices in developing countries like Nigeria, the use of these widely available devices by primary care physicians should be explored, hence the need to ascertain the experience of trainers in Family Medicine Training Centres with respect to ownership, knowledge of use of mobile phone functions, mobile phones health service use, and cell phone use cost. Information from this study will reveal strength of use, gaps, and opportunities that mobile phone service use by trainers could provide to improve patient care and postgraduate training in the Country.

Aim: The aim of this study was to assess Family Medicine Trainers' Experience with the use of mobile cell phones in patient care and patient management related self-education.

Objectives: This study sought to ascertain trainers' experiences (knowledge and use) with the use of mobile cell phone to provide outpatient primary medical care to patients; determine the level of ownership and type of mobile phones use by trainers; determine trainers' estimated cost of the use of mobile phone, and the willingness to contribute to cell phone related outpatient medical care as well as identify trainers' perceived problems with the use of mobile cell phone technology in patient care in Nigeria.

METHODS

Study Population

There were 72 Family Medicine Training Centres for postgraduate training in Nigeria in 201619. The training of postgraduate doctors in Family Medicine in these centres is carried out by specialists in Family Medicine supported by specialists in other specialties. Family Medicine specialists who are trainers are grouped into two- those certified as trainers and those yet to be so certified. This study has the Family Medicine Specialist trainers in Nigeria as its study population. Trainers do come together to attend a training of trainers' programmes and attendees of one of such events were targeted for the study.

This study was an exploratory cross-sectional survey of trainers attending a train the trainers' workshop jointed organized by the Faculties of Family Medicine of the National Postgraduate College of Nigeria and the West African College of Physicians, Nigeria Chapter at Keffi, Nasarawa State in Nigeria on the 17 June 2016. All trainers that registered for the course constituted the sampling frame for the study and were eligible for enrolment.

Sample Size estimation

Sample size: This was a planned survey of all participants of the targeted train the trainers' workshop. The workshop was estimated to register at least 100 trainers and the study was expected to secure a minimum of 75% return of responses from eligible participants (n=75).

Data Collection

A self-administered questionnaire was distributed to 125 out of the 139 trainers that registered for the TOT course and were available at the time of distribution of the questionnaire. The forms which were distributed midway during the workshop were collected at the end of the workshop on the same day. Only 109 questionnaires were returned out of which 107 were suitable for analysis.

Information collected covered socio-demographic data, ownership of mobile phones, and information communication technology (ICT) gadgets; experience with the use of mobile phones in outpatient medical care, the use of mobile phones to increase knowledge of patient care related issues; patient care related mobile phone expenditure; willingness to commit funds towards cell phone related patient-care and problems with the use of mobile phones in patient-care in Nigeria.

Data Analysis

Collated questionnaires were cleaned and information was extracted, computerized and analysed using EPi info 3.5.3 CDC Atlanta, USA20. Proportions of the variables of interest were estimated and relevant statistical tests applied. Statistical significance was recognized at a P-value of < 0.05.

Ethical consideration

Individuals were provided with self-administered questionnaires with a cover page that addressed consent. Those who declined consent just kept the forms and returned them at the end of the study. Individuals filled the forms at their own time privately, kept the form with them and returned them at the end of the workshop. The long-term benefit of the study to participants such as the provision of information that will enable trainers improve training related issues and scope of service delivery to patients were addressed in the consent. The study protocol was approved by the Ethical Research Committee of the Jos University Teaching Hospital.

RESULTS

One hundred and twenty-five forms (125) forms were distributed and 109 forms were returned giving a response rate of 87.2%. Two forms were incompletely filled and were excluded from further analysis. One hundred and seven forms (107) were found suitable for analysis.

Demographics of doctors

The one hundred and seven consultant-trainers had a male to female ratio of 3:1. There were 63 and 44 certified and uncertified trainers. The males were significantly older than the females with average ages of 47+7.3 to 42+4.0 years respectively (P = 0.02). Also, certified trainers were significantly older than uncertified trainers with mean ages of 50+8.6 to 45+6.8 years respectively (P= 0.002). Post fellowship years of practice range from 1-31 years while post national service years of practice range from 7-42. The trainers were from six different types of health institutions with 46.7% (50) being from University Teaching Hospitals, 14% (15) Federal Medical Centres, 12.1% Specialist Hospitals, 10.3% (11) General Hospitals, 10.3% (11) Mission Hospitals and 6.5% (7) Private Hospitals. The training health facilities spread across 23 states (64%) out of the country's 36 states. Details of this information are shown in Table 1.

Mobile Phone characteristics

All the 107 consultants had mobile cell phones with 99% (106/107) of phones being smartphones with internet and emailing features. Half of the trainers 50%) had 2 cell phones; 39% (42) had one cell phone and 11% (12) had 3 or more phones with one person having as many as 5 cell phones. A total of 186 cell phones were reported from 13 brand names comprising Samsung 30% (56), Nokia 17% (32), Tecno 15% (27), Black Berry 10% (19), Infinix 8% (15), I-phone and Gionee 6.5% (12) each while others accounted for 7% (13). Ownership of cell phones did not differ much between certified and uncertified trainers but there was a significant difference in the number of cell phones between male and female trainers in the ratio of 2:1. (P = 0.002). About 92 % (98) of the trainers have been using cell phones for more than 6 years.

Airtime providers to the trainers were MTN served 86% (92) of trainers, followed by Airtel 7.5% (8), GLO with 4.7% (5) and Etisalat 1.8% (2).

Data providers for email and internet service use were dominated by MTN which served 33.6% (36) of trainers, Airtel 24.3% (26), GLO 20.6% (22), Etisalat 19.6% (21) and others 1.9% (2). See details in table 2.

Ownership of other information communication technology (ICT) gadgets.

Trainers provided information on ownership of four other

ICT gadgets comprising laptop, desktop, I-pad and other tablet computers. Of the 106 trainers that provided the information, 38.7% (41) had only one of these gadgets, 41.5% (44) had 2, 14.0% (15) had 3 and only 5.8% (6) had all the four gadgets. About a third 37% (39) of trainers had laptop only, 29.5% (31) had both laptop and desktop computers. Most (61%) of the trainers had a laptop and at least one of the three gadgets while 53% (56) of trainers had tablet computing devices (I-pad or tablet computers or both).

Knowledge of the use of cell phones.

Smartphones have a range of functions. The most common ones in android systems include making calls (voice service); sending and receiving text messages (SMS); sending and receiving emails; browsing the web (internet); using the camera; video; MP player and radio; facility for video call such as Skype; and sending and receiving multimedia messages (MMS)21. Trainers provided information on their awareness of these functions and services in their cell phones, their ability to use them and whether they had used them in the three months preceding the study.

Information from the 106 trainers who responded to these questions showed that 90.6% (96/106) were aware of the existence of at least seven of these functions with 43% (46) being aware of all the functions. About 88% (93) could comfortably use at least six of these functions and only 27% (29/106) reported that they could carry out all the ten functions comfortably. Three months preceding the survey, 84% (89) used at least six of the functions with 59% (62) using the first seven functions and only 8% (8) used all the ten functions. Also, 20% (21) and 33% (35) of trainers used video conferencing and Multimedia services respectively during the same period. Details are shown in figure-1.

Experience with the use of Mobile Phones in outpatient care

Almost all (98%) of the trainers had cause to use the cell phone to call or send messages to a patient within in the three months preceding the study but only 97% (104/107) of trainers provided information on the nature of services rendered. Services provided to the patients included scheduling of appointment provided by 88% trainers; handling prescription related issues 85%; counselling on lifestyle changes such as diet, exercise, sleep etc. 72%; consultation on general disease symptoms 71%; handling information on laboratory results 64%; and addressing any other patient service delivery matter by 9% of trainers. Also, 39% (40) of trainers delivered 5 of these services, 24% (25) delivered 4 of the services, 19% (20) delivered 3 of the services, 9% (9) delivered 2 of the services and 7% (7) delivered only 1 of these services. However, only 3% (3) of trainers delivered the 6 components of the services. See details in figure-2.

Of the 105 trainers that provided information on their experience on cell phone health related communication, 40% (42) provided such services to less than 5% of their patients, 26.7% (28) of trainers provided services to 5-10% of their patients, 7.6% (8) of doctors to 11-20% of their patients, 11.4% (12) of trainers to 21-30% of patients, 3.8% (4) of trainers to 31 – 40% of patients, 5.7%(6) of trainers to 41-50% of patients while 4.8% (5) of trainers to 50% or more of their patients monthly. Overall 67% (70) of trainers provided services to 10% or less of their patients monthly.

Experience with the use of mobile phone to increase knowledge in patient related care issues.

Trainers also provided information on whether they had cause in the preceding three months to use their smartphones to increase their knowledge with respect to 4 service components that include the following: making a clinical diagnosis; prescribing medication; providing education or counselling; and handling any other patient management issues.

Of the 103 trainers that provided relevant information in this respect, 30% had used their phone to assess information with respect to prescription, 27% had done so with respect to education and counselling; 27% with respect to clinical diagnosis, 16% had done so in relation to other patient case management issues. Details are shown in figure-3. Common search engines used to access information include Google 93.4% (99) of trainers; Yahoo 49% (52), Firefox 48% (51), Chrome 40.6% (43), Explorer 36.8% (39) and others 42% (44). About 42% (44) of trainers use one to two of such search engines while the rest use between 3-5 search engines regularly. Also in communicating with trainers and trainees, trainers use a variety of social networking apps and 92% (95/103) of trainers engaged in such activity. Common among these were WhatsApp used by 92.8% (90/97) of trainers, Facebook 66% (64), Twitter 12.4% (12), BB-Chat 10.3% (10), IMO 8.2% (8), Instagram 5.2% (5).

Expenditure related to Mobile Phone use

Monthly expenditure on airtime range from N400 to 30,000

with a median expenditure of five thousand Naira (N5000). There was no significant difference in the average monthly expenditure on airtime with respect to gender. The estimated monthly expenditure on data ranged from N500 – N40,000 with a median expenditure of three thousand Naira (N3000). Also, there was no significant difference in median expenditure with respect to gender. Overall, a trainer spent on average N8,000 for both airtime and data use.

Twenty-six trainers (25%) were unwilling to contribute to airtime or data for patient related care. Only 80 trainers (75%) provided information on their willingness to support payment for airtime and data for patient related communication. Proposed contribution range from N400 to N7,000 with a median of N2,000 for data and N500 - N10,000 with a median of N2,000 for airtime monthly.

Regarding payment for airtime and data use for patient related service, 56% (58) of respondents felt that patients should pay for the service; 26% (27) felt government, patient and doctor should share the bill while 12 % (12) and 6% (6) of respondents felt government and doctors respectively should pay for the services.

Use of fitness Mobile apps

Seventy-six percent (81) of trainers did not have fitness or health applications in their mobile phones. Only 24% (26) had fitness apps in their mobile phones. Analysis of those with fitness apps showed that 34.6% had apps for exercise, 24.3 % for weight monitoring, 19% for diet; 9.6% (5) water intake monitoring, 13.5% for others such as counselling and ovulation tracking. 43% of trainers had only 1 app, 23% had 2 apps, 15.4% had 3 apps, 15.4% had 4 apps and only 3.8% had more than 4 apps. Details are shown in figure-4.

Ninety-two percent (24) of trainers with fitness apps were using them for tracking their personal health and fitness. About two thirds (42%) of trainers were using only 1 apps, 29% (7) were using 2 apps, 8.3% were using 3 apps, 4.2% were using 4 apps. Most (71%) of trainers were using a physical exercise app either alone or in combination, 54% were using weight monitoring app either alone or in combination and 12.5% were using dietary caloric monitoring apps either alone or in combination with other apps.

Prescription of fitness apps to patients

Sixty-two percent (16) of trainers that had apps recommended their use to patients in the preceding three months prior to the study. 53.8% (14) of trainers had recommended physical exercise apps, 38.5% (10) weight monitoring, 38.5% (10) dietary caloric monitoring, 15.4% use of water and 3.8% recommended other apps such as ovulation monitoring. These applications were either recommended alone or in combination.

Problems with the use of Mobile Phone Technology in patient care in Nigeria

Ninety percent of trainers (94) provided 327 responses with respect to the challenges with the use of mobile phone technology in patient-care. Analysis of their responses on a list of ''common problems affecting the use of mobile phone technology in patient care in Nigeria'' showed that absence of a payment for over the phone consultation and service top the list with 78% of trainers picking this problem, followed by high cost of data with 63%, while both low patients' knowledge and high cost of calls scored 57% each. Low physicians' knowledge was reported by 50% of trainers. High cost of text messages scored 21% and other problems (network failure, absence of battery power, absence of confidentiality, no restrictions) scored 21%. This information is illustrated in figure-5.

DISCUSSION

This study can be described as the first formal survey that examined medical postgraduate trainers' experience on the use of mobile phone in patient-care in West-Africa in general and in Nigeria in particular. The return rate of the distributed questionnaires of 87.2% was good and higher than 65.5% reported among Resident doctors use of cell phone in Nigeria but lower than the 100% reported among General Practitioners (GPs) in China4,22. The improved return rate of questionnaires in this study may be due to the high level of awareness of the importance of research of this nature by the study participants and the short duration of the training period which did not allow participants to take the questionnaires outside the training venue.

Mobile Phone and other ICT gadgets characteristics

This study showed that all trainers own mobile phones with 99% being smartphones. This 100% ownership of mobile phone is similar to the 99.4% reported among healthcare professionals in Lagos and 100% ownership reported among Family Medicine Resident Doctors in Nigeria but higher than 90.4% reported among GPs in Eastern China and 85% reported among ACGME Medical providers in the US 4, 23,24. The high level of smartphone acquisition may not be

unconnected with the observation that the smartphone has robust computing features that had make it an essential tool for postgraduate education in both developed and developing countries25,26,27,28. The higher male to female ratio in this study agrees with the observation of higher numbers of male than female physicians in medical education and work in developing countries29.

Two thirds (61%) of the trainers had two or more cell phones. This is lower than the 65.5% reported among resident doctors in Nigeria but higher than 9% reported among surgical trainees in Scotland UK25. The need to have a higher number of cell phones may be due to the dynamics of mobile communication service delivery in Nigeria where each service provider has limited geographic coverage warranting the need for one to have more phones to ensure access to mobile communication services irrespective of users' geographical location4. The predominance of Samsung and Nokia brands and low prevalence of I-phone brands in this study are in keeping with other studies from Nigeria which had reported the high penetration of these brands in the Nigerian market, while the low prevalence of I-phone use has been observed to be due to its relatively high cost4,23. Male trainers had a significantly higher number of cell phones compared to their female counterparts. This finding was surprising but may not be unconnected with the higher tendency of male trainers to engage in private practice and visiting consulting services in geographical locations other than their places of primary assignment thus warranting the need to have additional cell phones for improved access to services.

Airtime service provision was dominated by MTN which provided services to 86% of trainers. This was similar to the 85% reported among Family Medicine Resident doctors in Nigeria and higher than 37.5% reported among health workers in Lagos, Nigeria23. The dominance of MTN in this service provision may be due to the wide geographical accessibility of its services30. As regards provision of data for internet browsing and social networking, MTN again led other service providers by providing such services to 33.6% of trainers which was higher than 28.8% of GLO provision of data service to Resident doctors in Nigeria. The higher patronage of MTN data service may be due to the ease of access of such services coupled with the relatively higher earning power of trainers as compared to postgraduate trainees like resident doctors who tend to patronize the relatively cheaper GLO data service4.

About two-thirds (61%) of trainers had a smartphone, a laptop and either a desktop or tablet computing device. Also 53% of trainers had tablet computing devices. The 53% ownership of tablet computing devices is higher than the 40% reported among academic physicians and trainees in the USA in 201131. The higher level in this study could be due to the time difference in the studies and the global increase in the use of ICT technology.

EXPERIENCE WITH MOBILE PHONE USE IN PRIMARY CARE

Knowledge of common functions of a smartphone:

Self-reported knowledge of 10 commonly used functions of a smartphone was assessed. About 91% of trainers were aware of at least seven of the 10 functions in their cell phones with 43% of them being aware of all the 10 functions. This level of awareness is lower than the 96.8% reported among Family Medicine Residents in Nigeria. However, the difference in awareness level may be due to the fact that trainers reported awareness was based on seven rather than six of the 10 functions used in the resident doctors' study4. Also, only 88% of trainers could use at least six of such functions with 27% reporting that they could use the 10 functions comfortably. Three months preceding the study, 84% of trainers had used six of such functions and 8% had used all the 10 functions. 20% and 33% of trainers had used video conference and multimedia services during the same period which is higher than the 18.2% and 24.7% respectively reported among resident doctors in Nigeria4. The higher level of involvement of trainers with the use of these features may not be unconnected with the higher learning needs such as the need to get involved in virtual faculty development and partnership activities.

Use of mobile phone in outpatient care.

The use of smartphones to facilitate outpatient care as reported by 97% of trainers in this study was good and higher than 94.8% reported among resident doctors in Nigeria and 67% reported among General Medical Practitioners in Hangzhou China4,22. The higher levels of involvement in this study may be due to both the clinical and research work of the trainers which require enhanced follow-up of patients involved in research in the academic centres and receiving general care in public and private practices.

Forty percent of trainers provided services to less than 5% of their patients while 33% provided such services to at least 10% or more of their patients. These levels of services

delivery were better than the 50% and 24% respectively reported among resident doctors in Nigeria4. These differences are probably due to the nature of the clinical services being provided by trainers comprising clinical care in multiple settings such as academic centres including research and private practices.

The type of services delivered include scheduling of appointment by 88% trainers, prescription of medications 85%, consultation on general disease symptoms 71%, advice on lifestyle changes 72%, handling of laboratory results 64%, and other issues related to patient management 9% of trainers. About 39% of trainers provided 5 out of these six services. The scheduling of appointment by 88% of trainers is higher than the 42% reported among physicians in the US by Accountable Physicians Practices32. This higher level from this study may be due to difference in time of the US study which was carried out two years preceding this study and the rapid growth of cell phone market in the developing countries of Africa.

As regards the use of cell phone to increase knowledge in patient related care management, 30% of trainers accessed information on drug prescription, 27% on education and counselling, 27% on clinical diagnosis and management. These proportions were lower than 89.3%, 84% and 80.7% respectively reported among resident doctors in Nigeria and also 52%, 63.3% and 59.2% respectively reported among junior doctors in a regional survey in the UK4,25. The lower proportions in this study is likely due to the higher level of clinical knowledge and skills of trainers when compared to postgraduate doctors in training who require additional information to meet evidence based standards of clinical service delivery.

Only 24% of trainers had apps that tracked fitness and wellbeing and 92% of them were using the apps to track their personal health activities. The 24% prevalence of fitness and wellbeing tracking apps was similar to 23.9% reported among resident doctors in Nigeria while the personal usage of such apps by 92% of trainers was higher than the 70% reported among the resident doctors' study. The better indices of both ownership and use of fitness and wellbeing apps by the trainers may be due to the influence of the embedded lifestyle medicine program being taught by trainers in the postgraduate training programs coupled with the high awareness and needs for improved health of the aging trainers. Most (62%) of the trainers with fitness and wellbeing tracking apps recommended such apps to patients and 53.8% of such recommendation was on tracking physical activity. The level of recommendation of physical activity apps to patient accounting for 53.8% is similar to 52% reported among practicing physicians in the US by the Council of Accountable Physician Practices4,32.

The use of fitness and wellbeing apps by trainers to track personal health and fitness is relatively high and encouraging. This suggests that trainers may have acquired the apps for self-use first before prescribing such to patients. Such a practice where clinicians use and share their experiences with patients especially in the area of healthy habit development has been reported to enhance success in patient behavioural change outcomes33.

Cost of Mobile phone use

The median monthly expenditure of N5,000 for airtime and N3,000 for data by trainers is higher than the N3,000 and N2,000 respectively reported among resident doctors in Nigeria and also higher than the N2,000 and N1,000 reported among healthcare workers in Lagos4,20. The higher expenditure by trainers may be due to the demand of their work necessitating following up patients in both academic centres and private practice and their relatively higher income.

About 75% (80) of trainers indicated willingness to commit their resources towards cell phone related patient care and were willing to contribute 50% (4000/8000) of their total median expenditure on cell phone to patient related care. The 50% level of commitment is higher than the 20% and 33% reported among registrars and senior registrars respectively in Nigeria4.

Challenges with Mobile Phone use in healthcare

Problems hampering the effective use of mobile phone technology in Nigeria highlighted in this study include absence of payment mechanism for mobile phone consultation and services which accounted for 78% of responses, high cost of data (63%), high cost of calls (57%), low patient knowledge (57%) and high cost of text messages (21%). The 78% who complained of lack of payment mechanisms is similar to the 81% reported among resident doctors in a similar study in Nigeria4. Also, the high cost of calls and text have been reported by previous studies in Nigeria and by researchers from other countries such as UK4,8,23, 25, 34.

CONCLUSION

Ninety-eight percent (98%) of trainers had experience with

cell phone related patient care that mainly addressed scheduling of appointments, prescription of medications, advice and counselling on lifestyle changes or general disease symptoms; and handling of laboratory results. Most (67%) trainers provided such services to less than 10% of patients. However, cell phone use cost and absence of a payment mechanism for cell phone related services were key hindrances to service delivery.

It is recommended that training institutions strengthen mobile phone service delivery infrastructure and leverage on trainers' cell phone experience and willingness to commit resources and use that to improve coverage, service efficiency and medical residency training in the country.

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Table 1

Socio-demographic Characteristics of the Trainers

Training Centres	**Trainers**	
	N=107	**%**
Teching Hospital	50	46.7
Federal Medical Centre	15	14.0
Specialist Hospitals	13	12.1
General Hospital	11	10.3
Mission	11	10.3
Private Hospital	7	6.5
Traing Status	N=107	%
Certified Trainers	63	59.0
Un-certified	44	41.0
Gender	N= 107	%
Male	87	81.3
Female	20	18.7
Average years of Practice post Fellowship	N=105	%
0 - 5	38	36.2
6 - 10	35	33.3
11 - 15	15	14.3
16 - 20	8	7.6
21 - 25	5	4.8
> 25	4	3.8

Table 2a

Mobile Cell Phones Characteristics

Type of Phones	N =107	%
Smartphone	106	99.1
Simple cell phone	1	0.9
Individuals' Number of Phones	N = 107	%
1	42	39.3
2	53	49.5
3	10	9.3
4	1	0.9
5	1	0.9
Male to Female ratio of Cellphone ownership	2:1	P=0.02
Duration of Phone use (years)	N = 107	%
0 - 2	6	5.6
3 - 4	2	1.9
5- 6	1	0.9
> 6	98	91.6
Airtime Providers	N = 107	%
MTN	92	86
Airtel	8	7.5
GLO	5	4.7
Etisalat	2	1.9
Data Service providers	N =107	%
MTN	36	33.6
Airtel	26	24.3
GLO	22	20.6
Etisalat	21	19.6
Others (Vodafone, Visaphone)	2	1.9
Mobile Phone brands	N = 107	%
Samsumg	37	34.6
Nokia	22	20.6
Techno	15	14
Black Berry	8	7.5
Infinix	6	5.6
I-Phone	5	4.7
Others	14	13.1

Table 2b

Ownership of Computers and Cost of Use of Cellphone

Ownership of computers	N = 105	%
Laptop	39	37.1
laptop and Tablet	20	19
Laptop and I-Pad	13	12.4
Laptop and Desktop	10	9.5
Laptop, Desktop, I-pad	8	7.6
Laptop, Desktop, Tablet	7	6.7
Laptop, Desktop, Tablet, I-pad	6	5.7
Other combinations of computers	2	1.9
Tablet computing devices (I-phone or Tablet)	56	53.3
Median Monthly Cellphone use cost	Naira	$*
Airtime	5,000	20
Data	3,000	12
$* = 1 USD = N250 at the time of study		
Willingness to contribute to patient care services. [average monthly total contribution (Naira)]	N=106	%*
Airtime	2,000	25
Data	2,000	25
* % of contribution to total monthly Mobile Phone use expenditure		

Figure 1

Awareness and Use of Mobile Cell Phone Functions

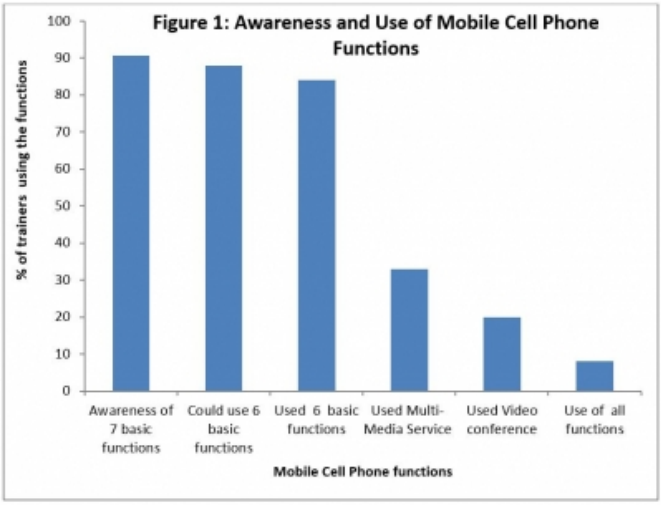


Figure 2

Type of Mobile Phone services Provided to Patients

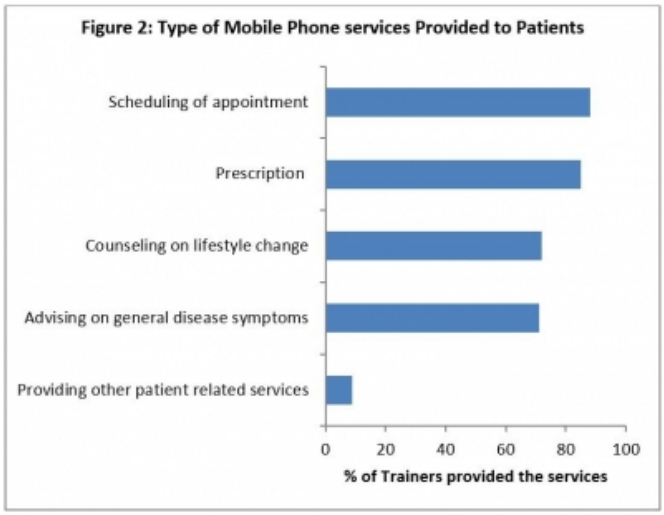


Figure 3

Cellphone use to increase knowledge in Patient Care

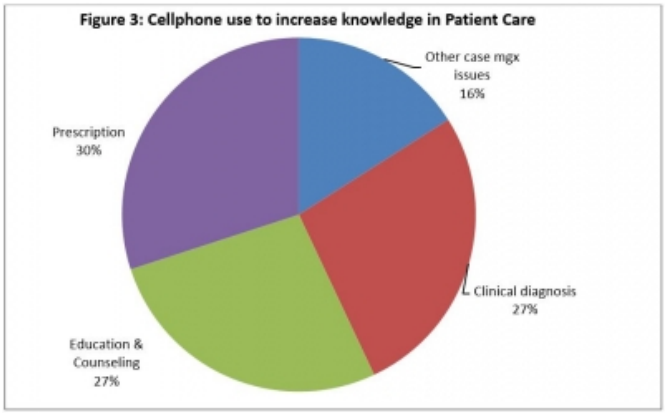


Figure 4

Type of Health Mobile Apps in Trainers Phones

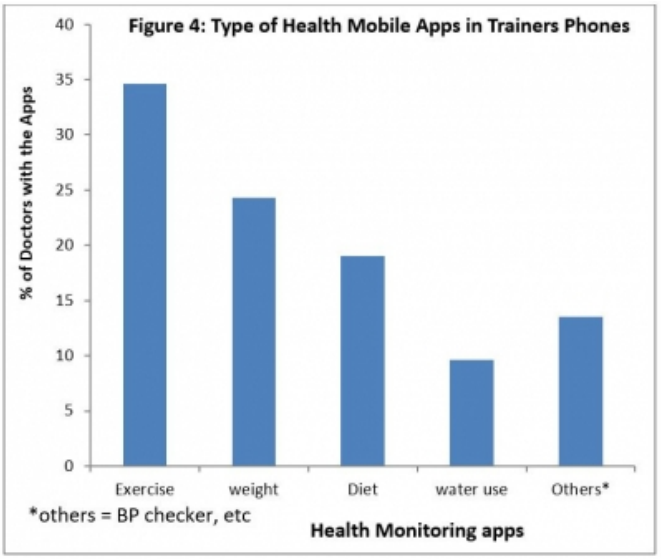
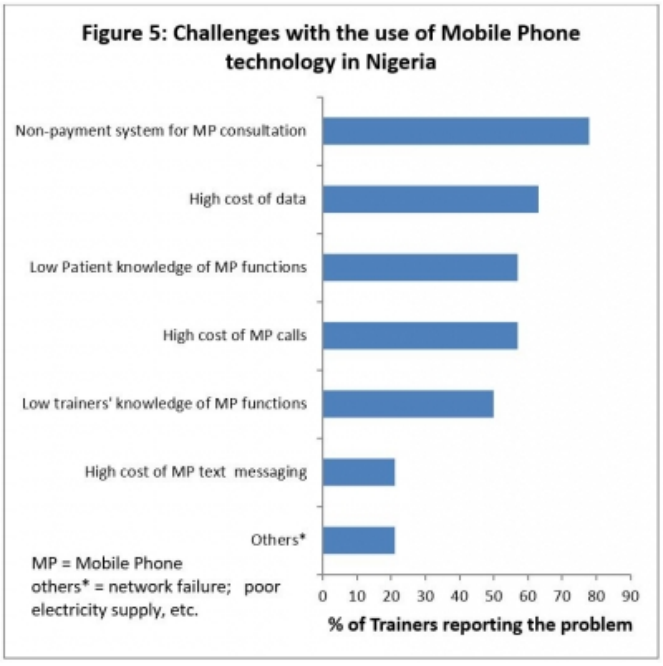


Figure 5

Challenges with the use of Mobile Phone technology in Nigeria



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